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METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
WITHIN AN INTERACTION REGION OF A STRUCTURE
IRRADIATED WITH LASER LIGHT

Inventors: Paul E. Denney et al Filed.: March 18, 2004

Atty Docket: LOMASR.026CP1

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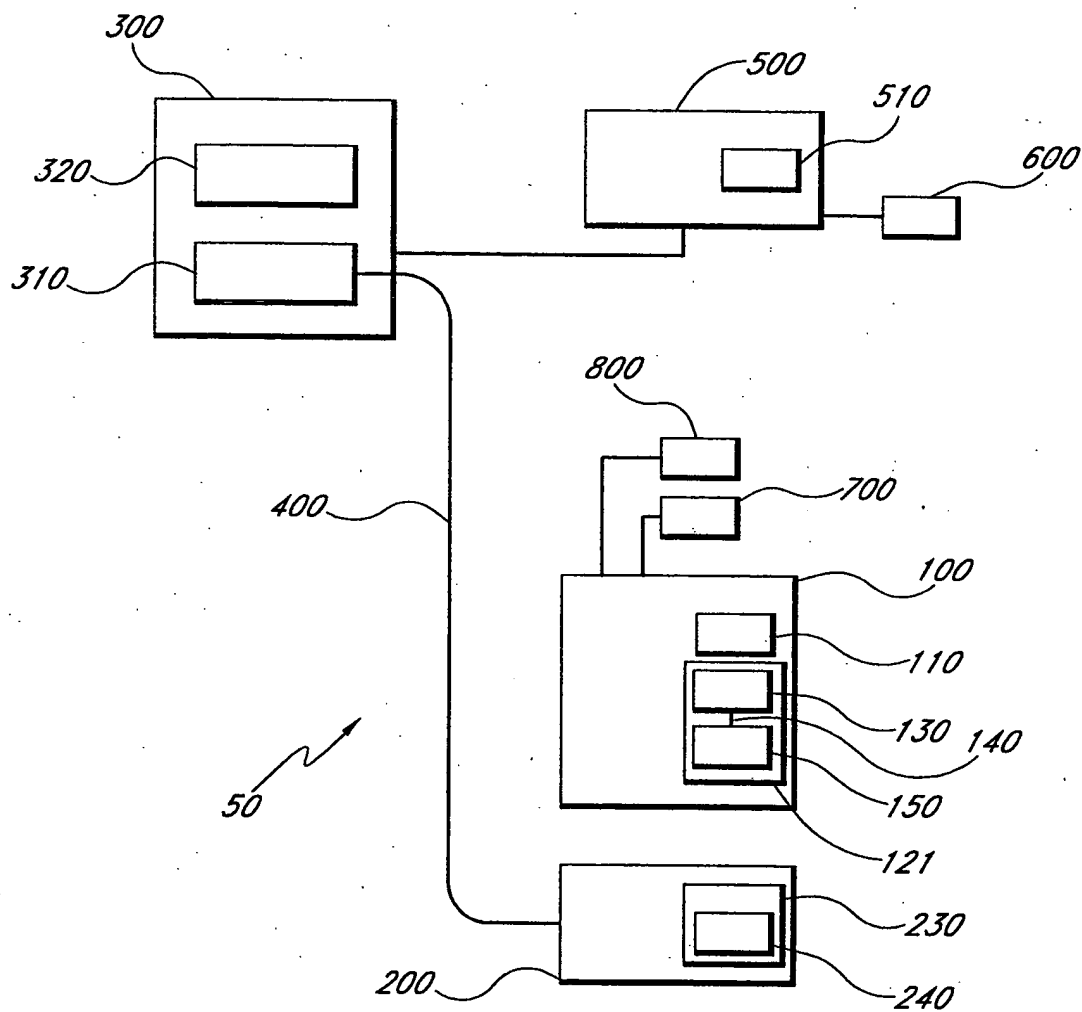


FIG. 1

**METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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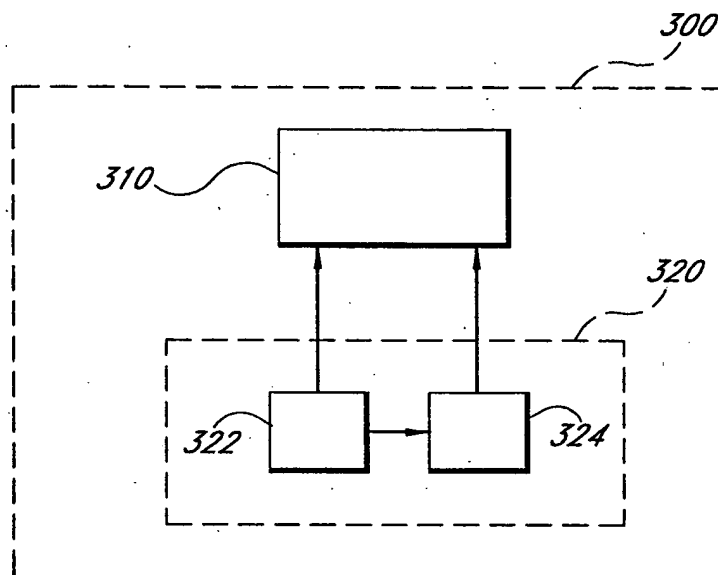


FIG. 2

*METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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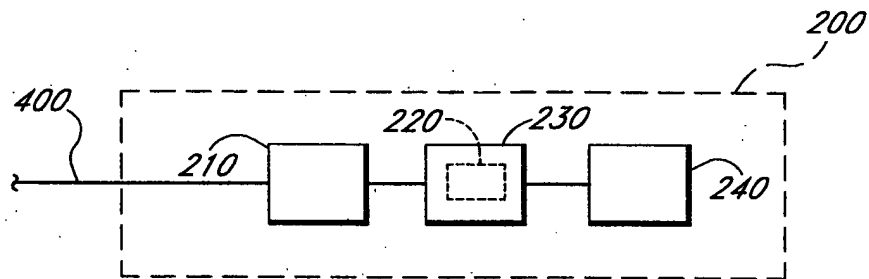


FIG. 3A

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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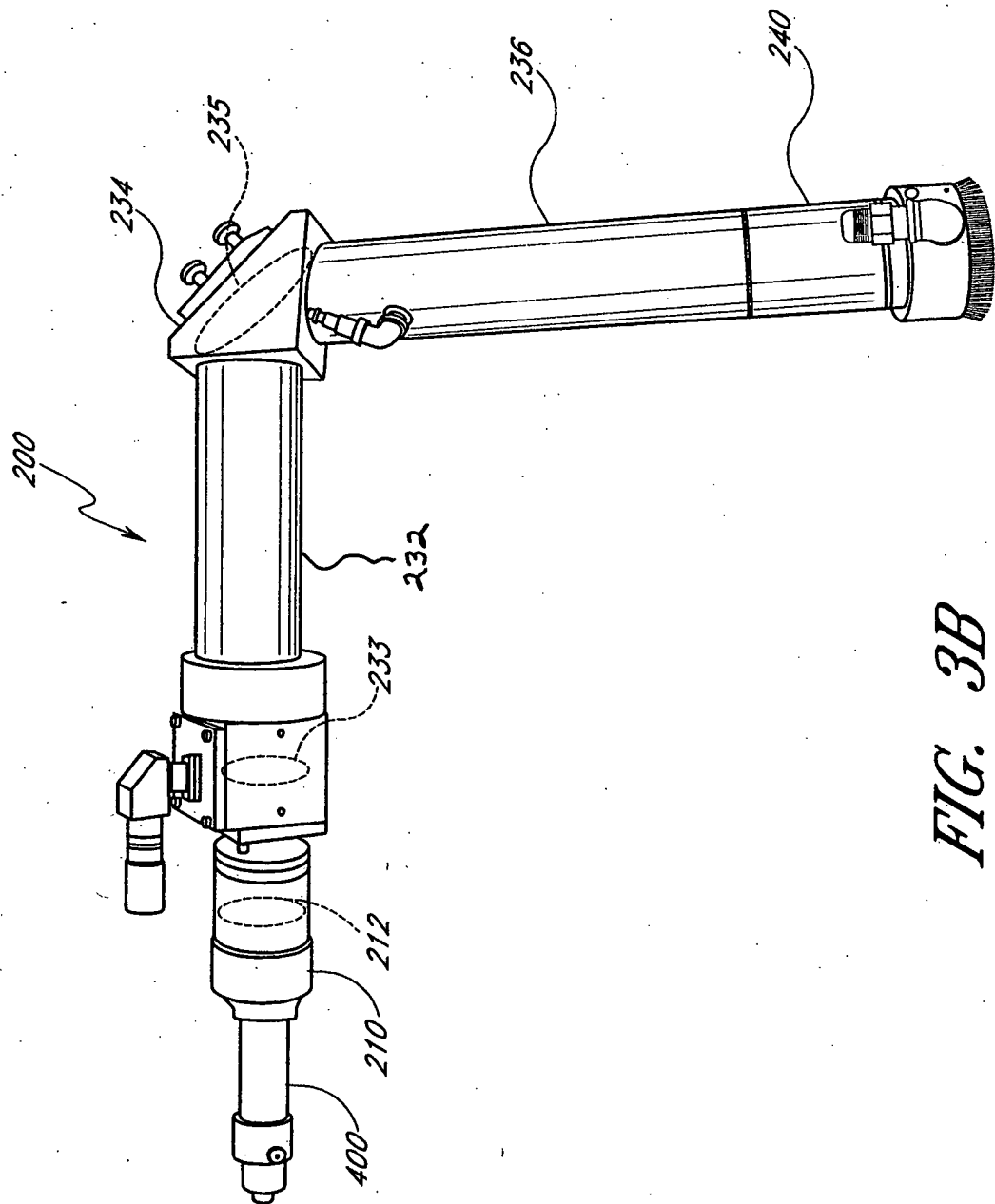


FIG. 3B

**METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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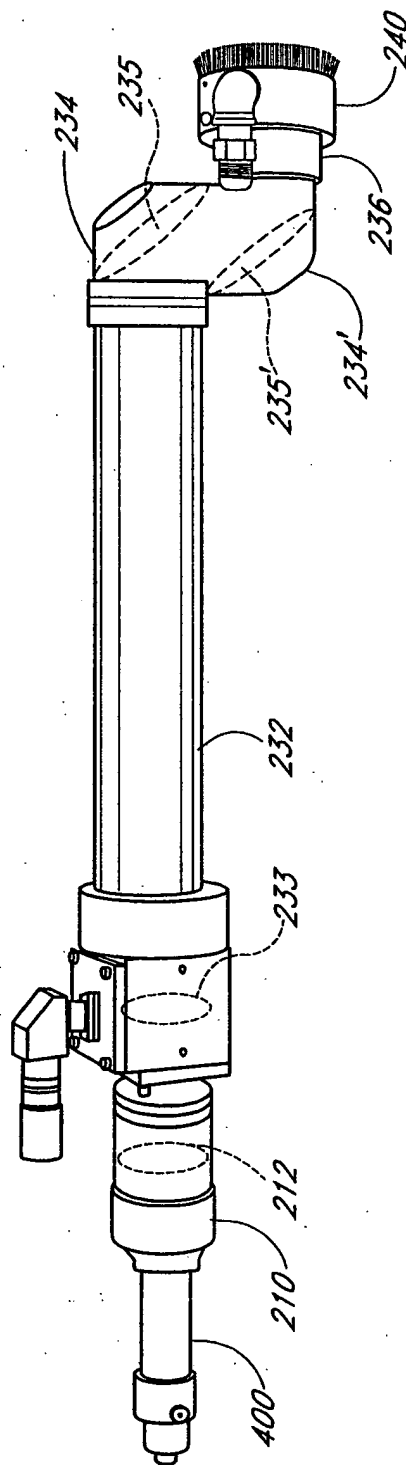


FIG. 3C

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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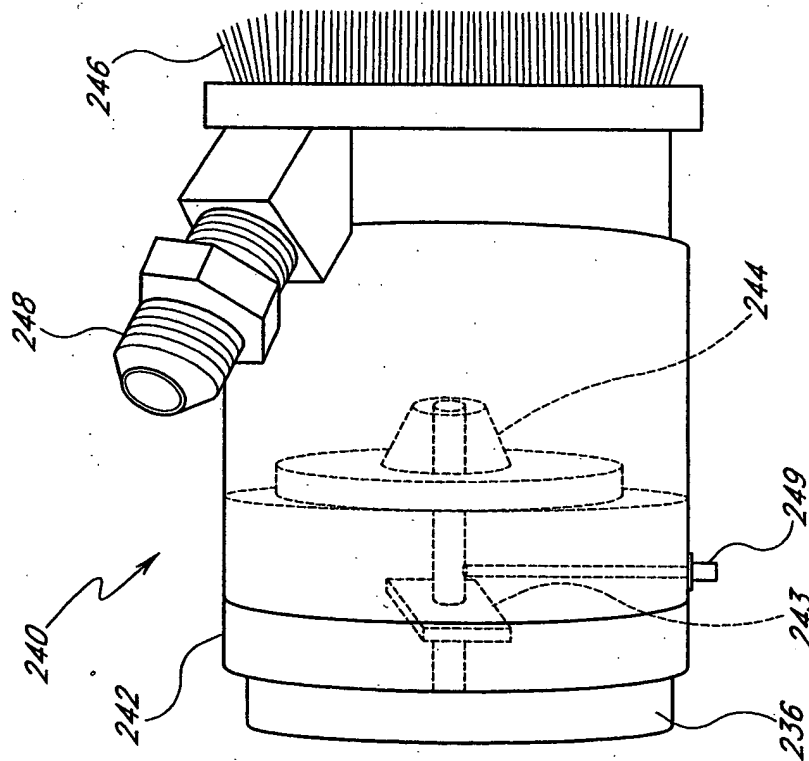


FIG. 4

**METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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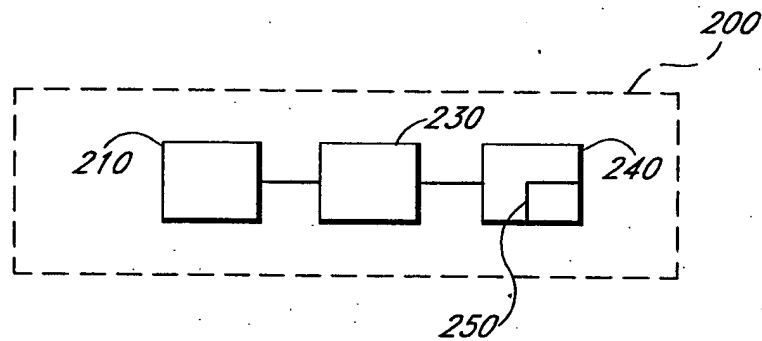


FIG. 5

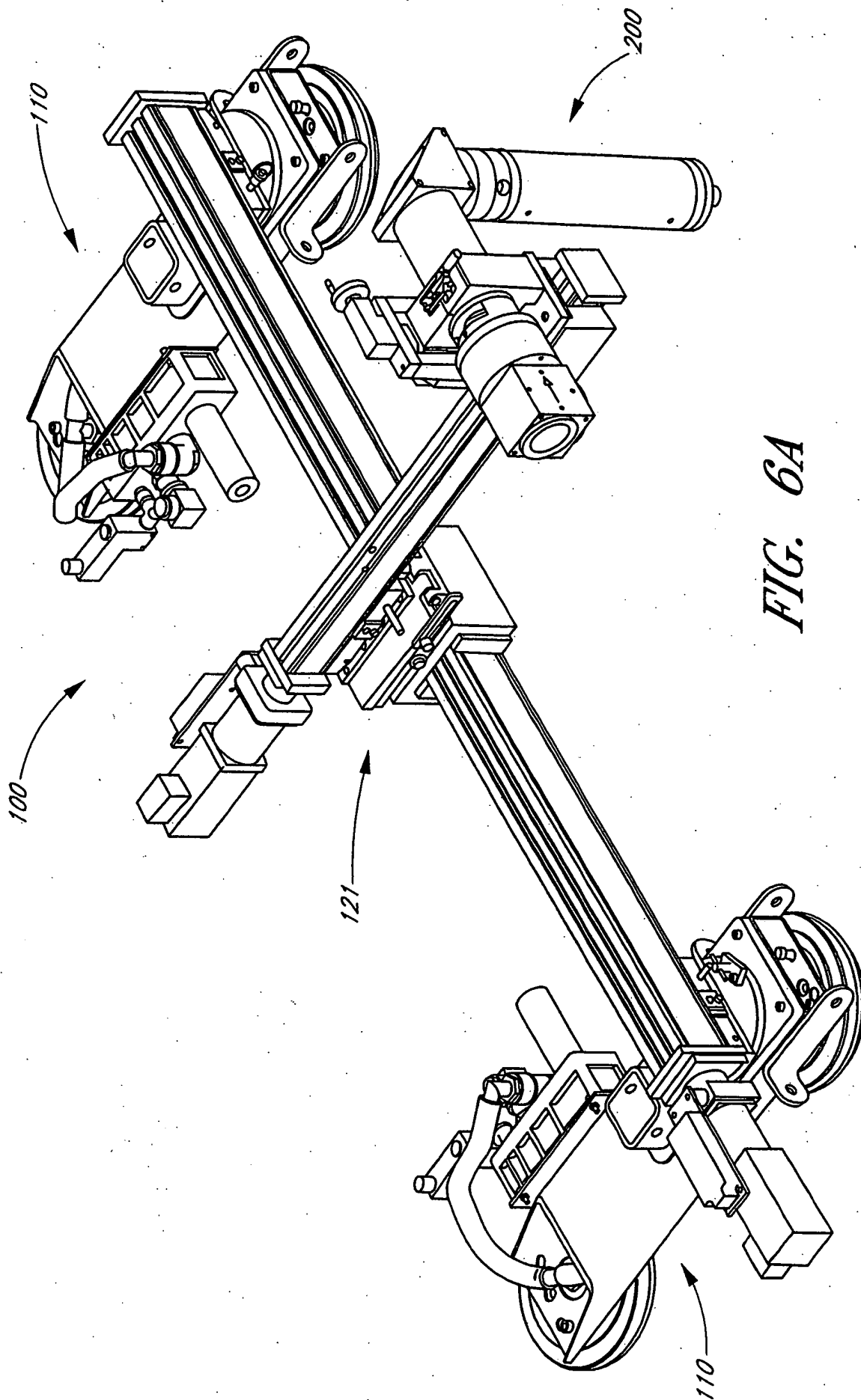


FIG. 6A

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
 WITHIN AN INTERACTION REGION OF A STRUCTURE
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 Inventors: Paul E. Denney et al Filed: March 18, 2004
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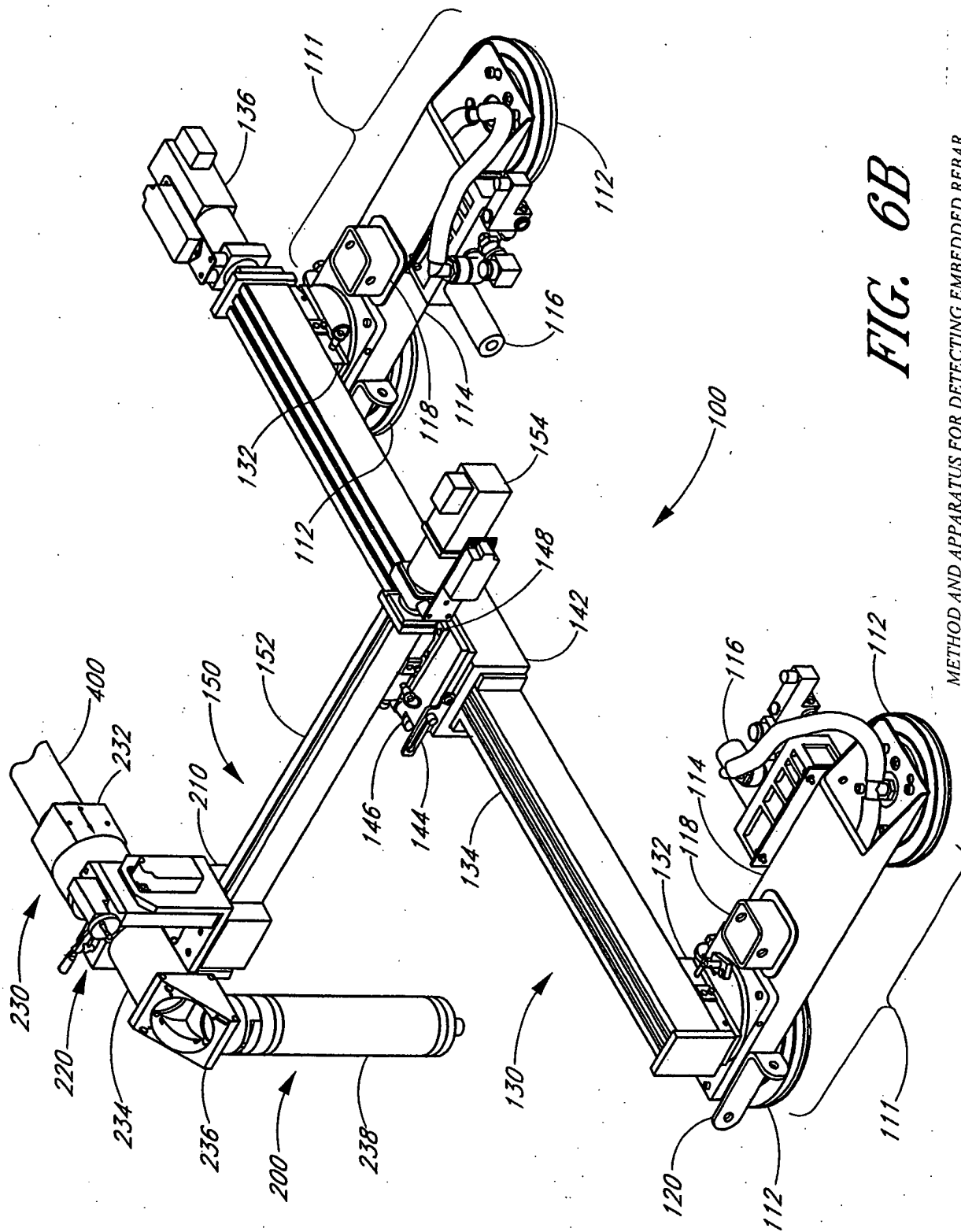


FIG. 6B

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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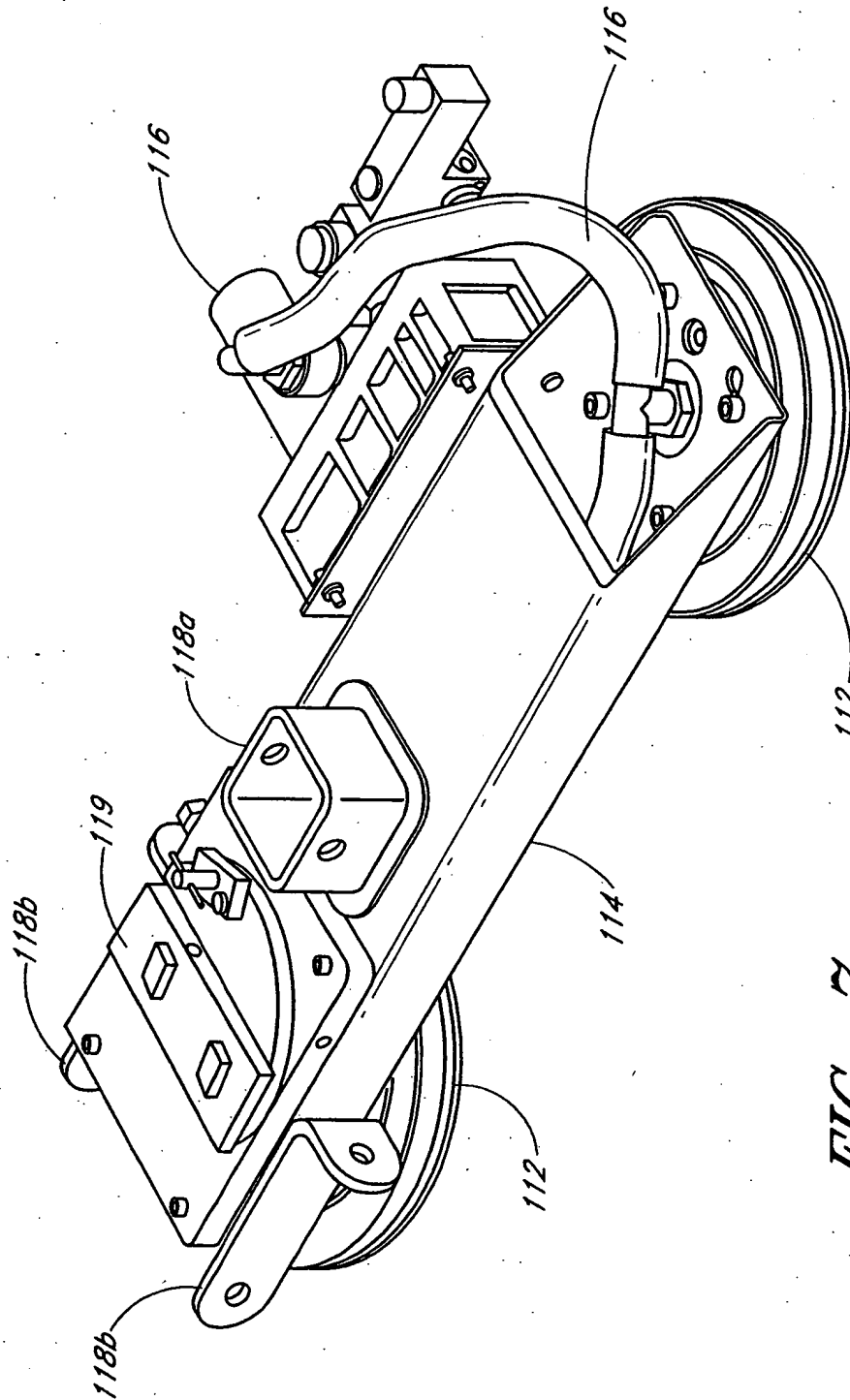


FIG. 7

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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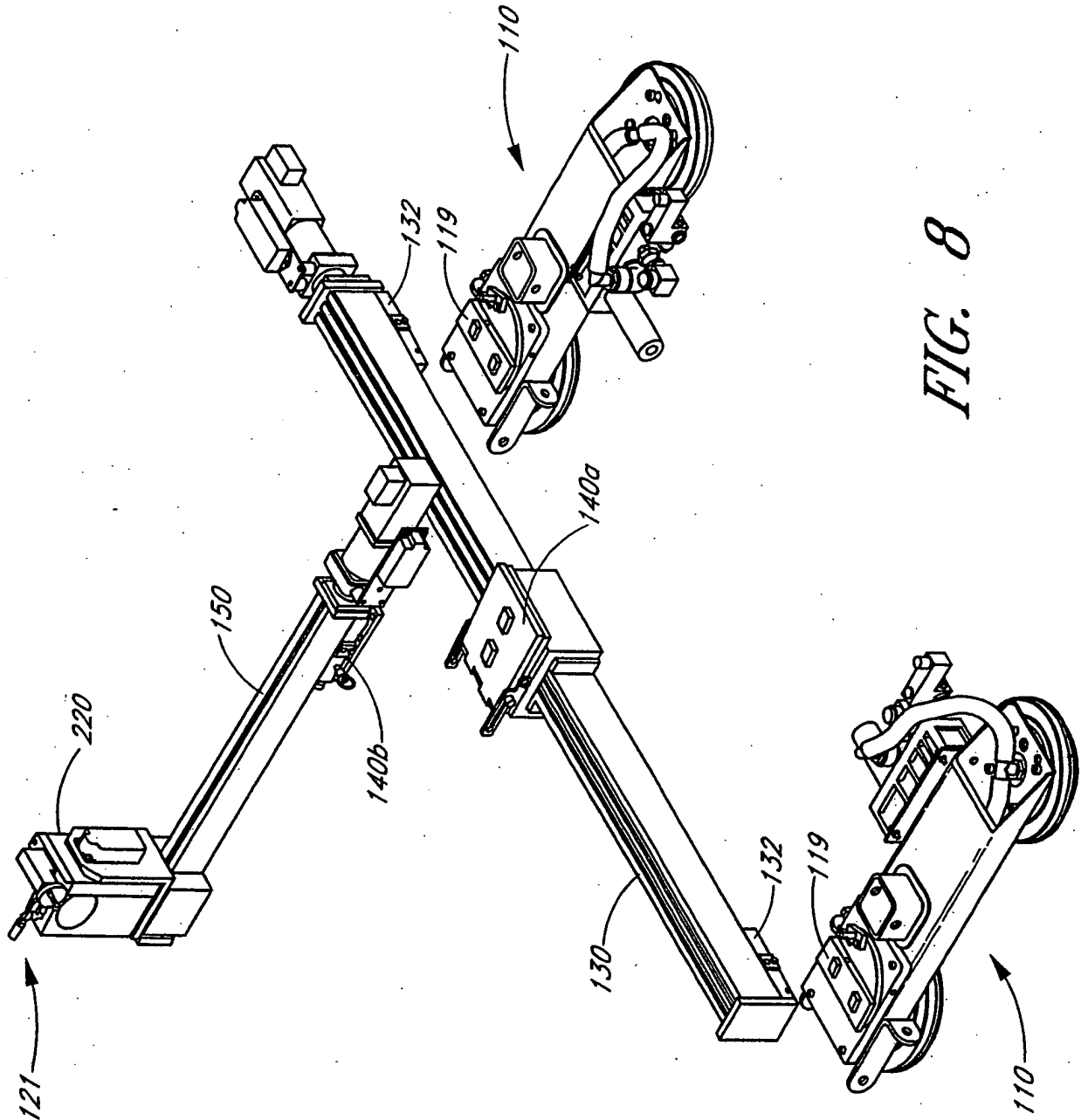


FIG. 8

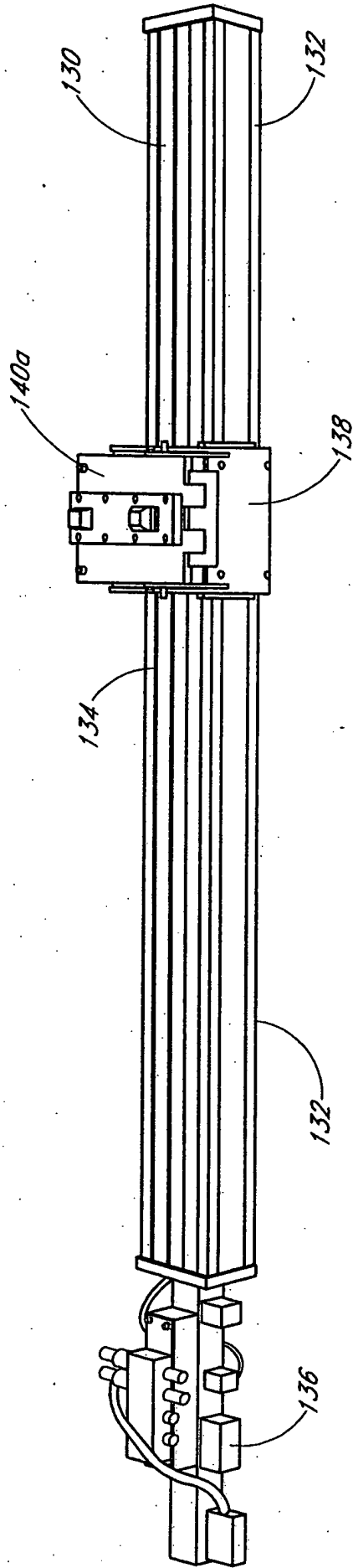


FIG. 9

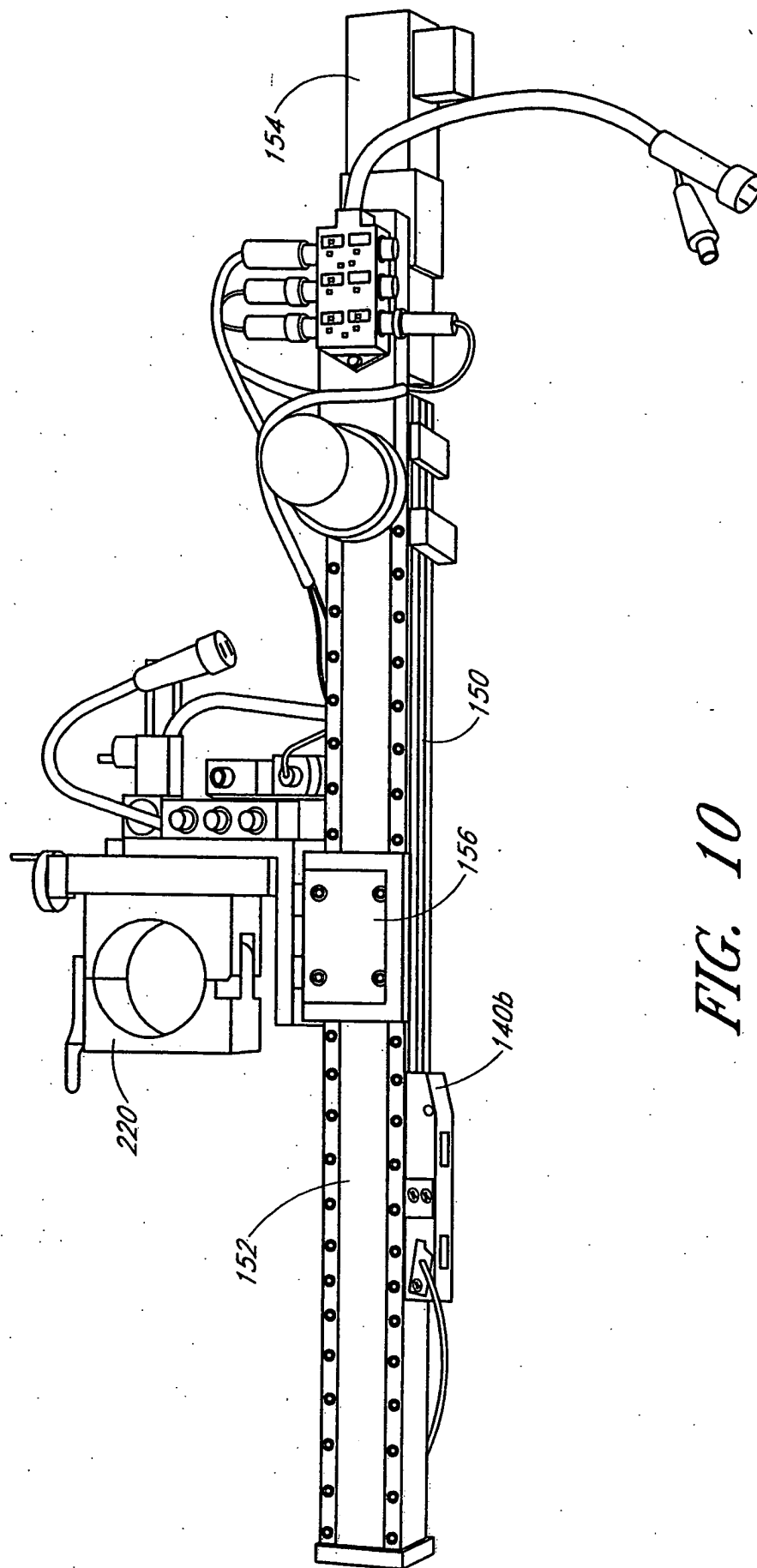


FIG. 10

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
WITHIN AN INTERACTION REGION OF A STRUCTURE
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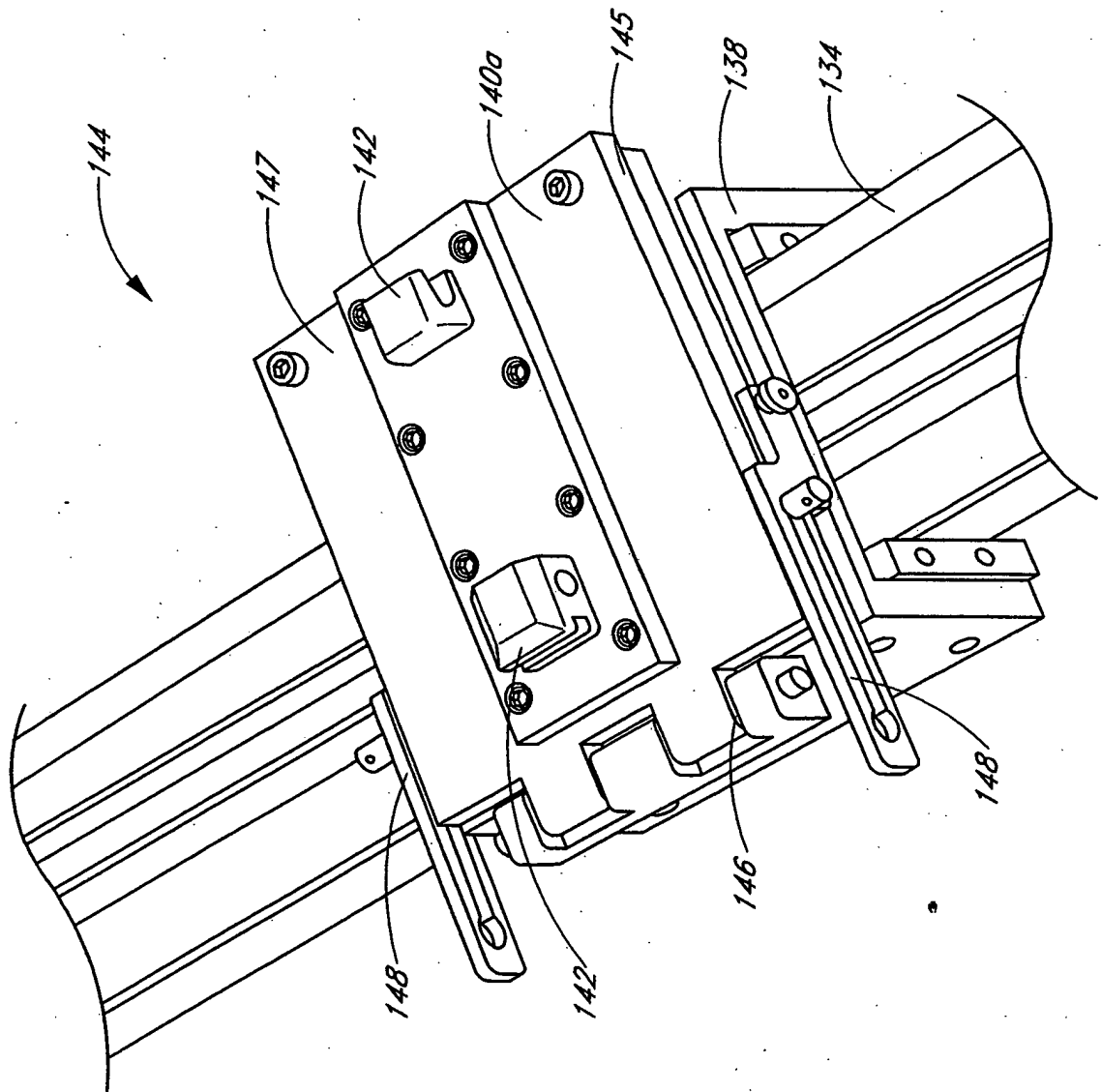
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FIG. 11A



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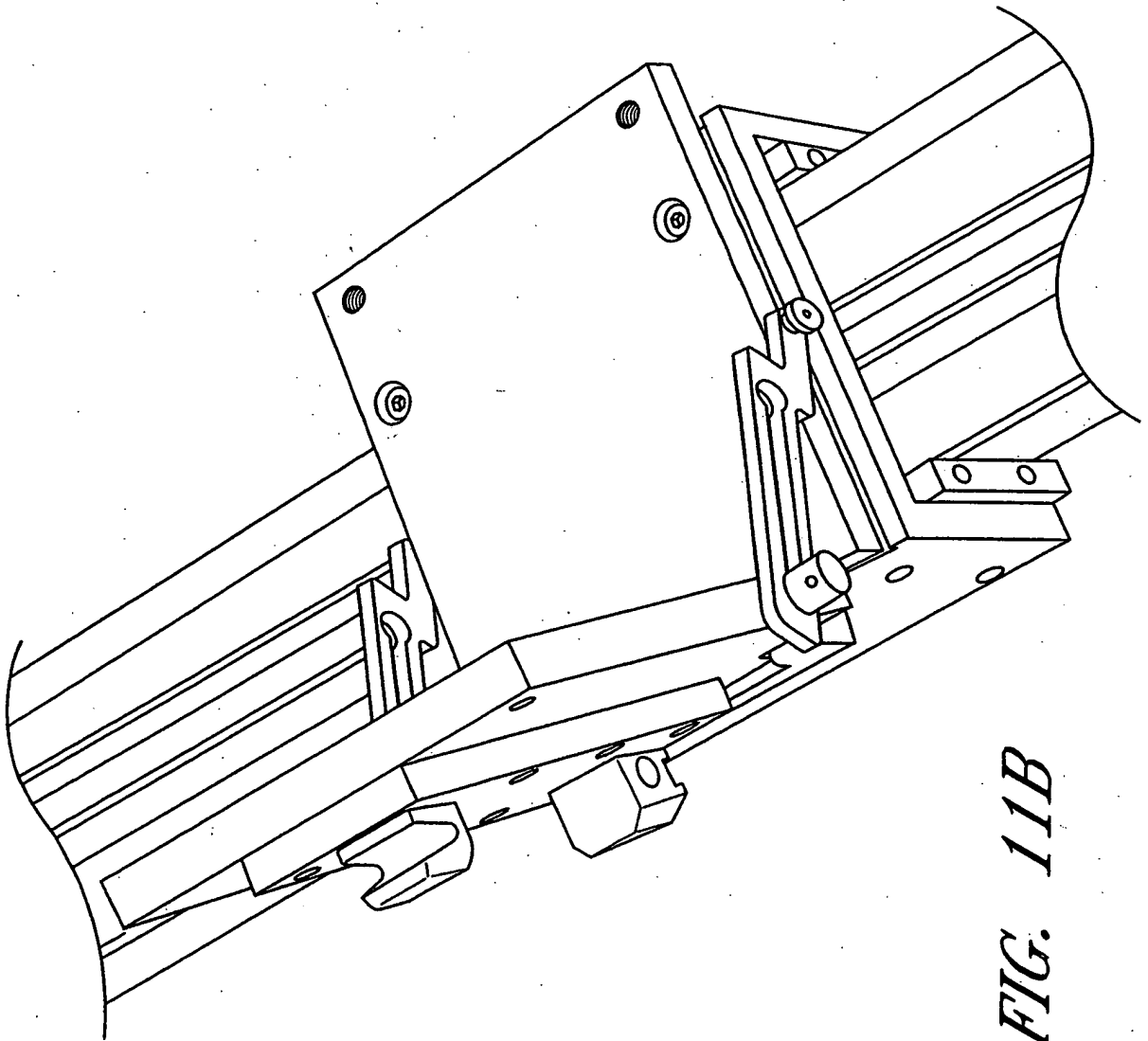


FIG. 11B

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
WITHIN AN INTERACTION REGION OF A STRUCTURE
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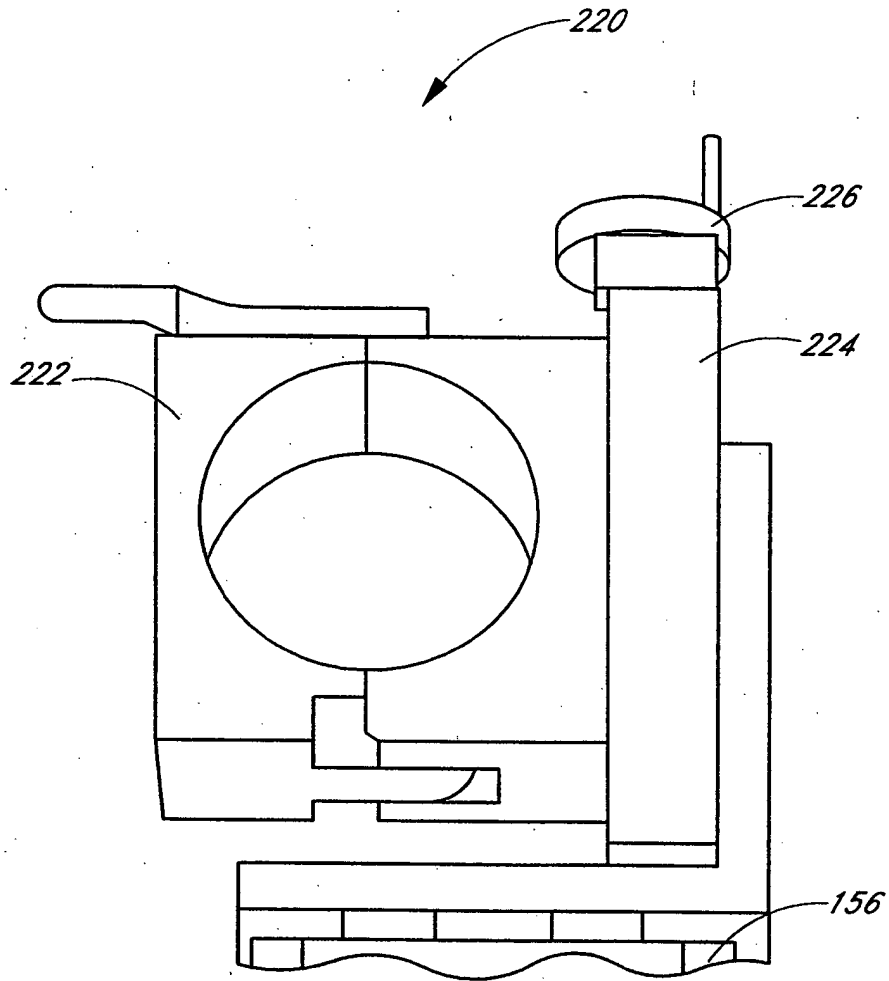


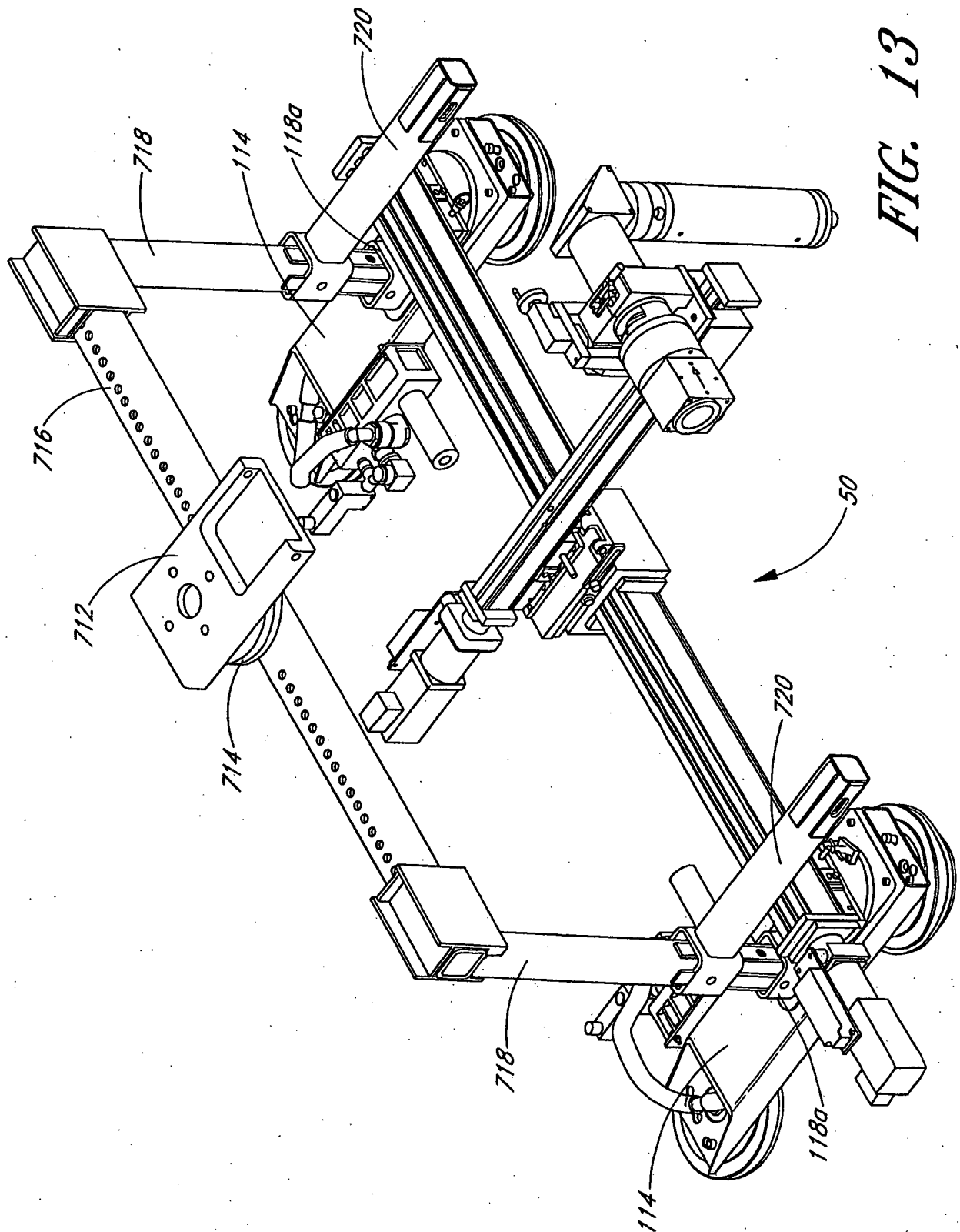
FIG. 12

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
WITHIN AN INTERACTION REGION OF A STRUCTURE
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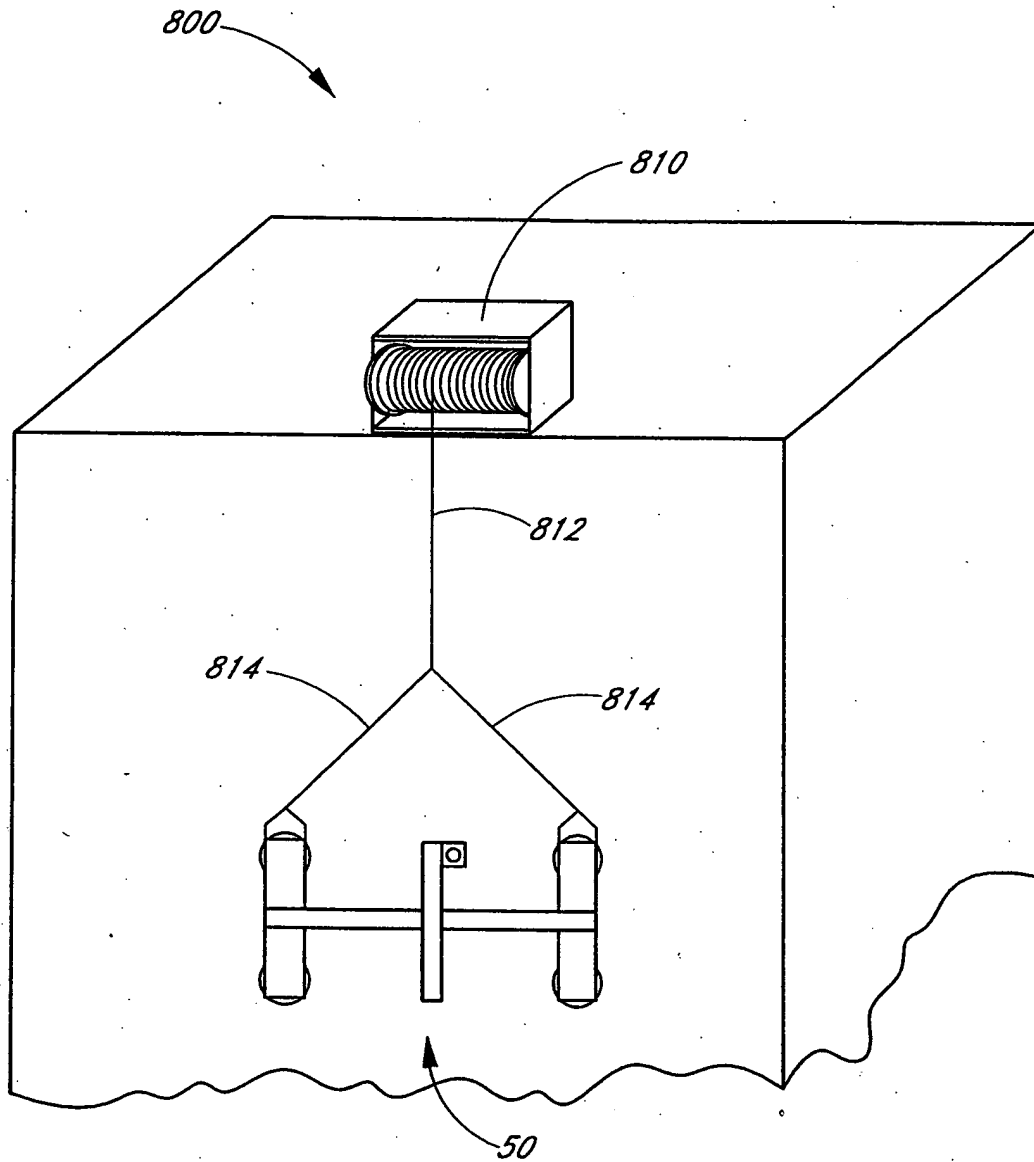


FIG. 14A

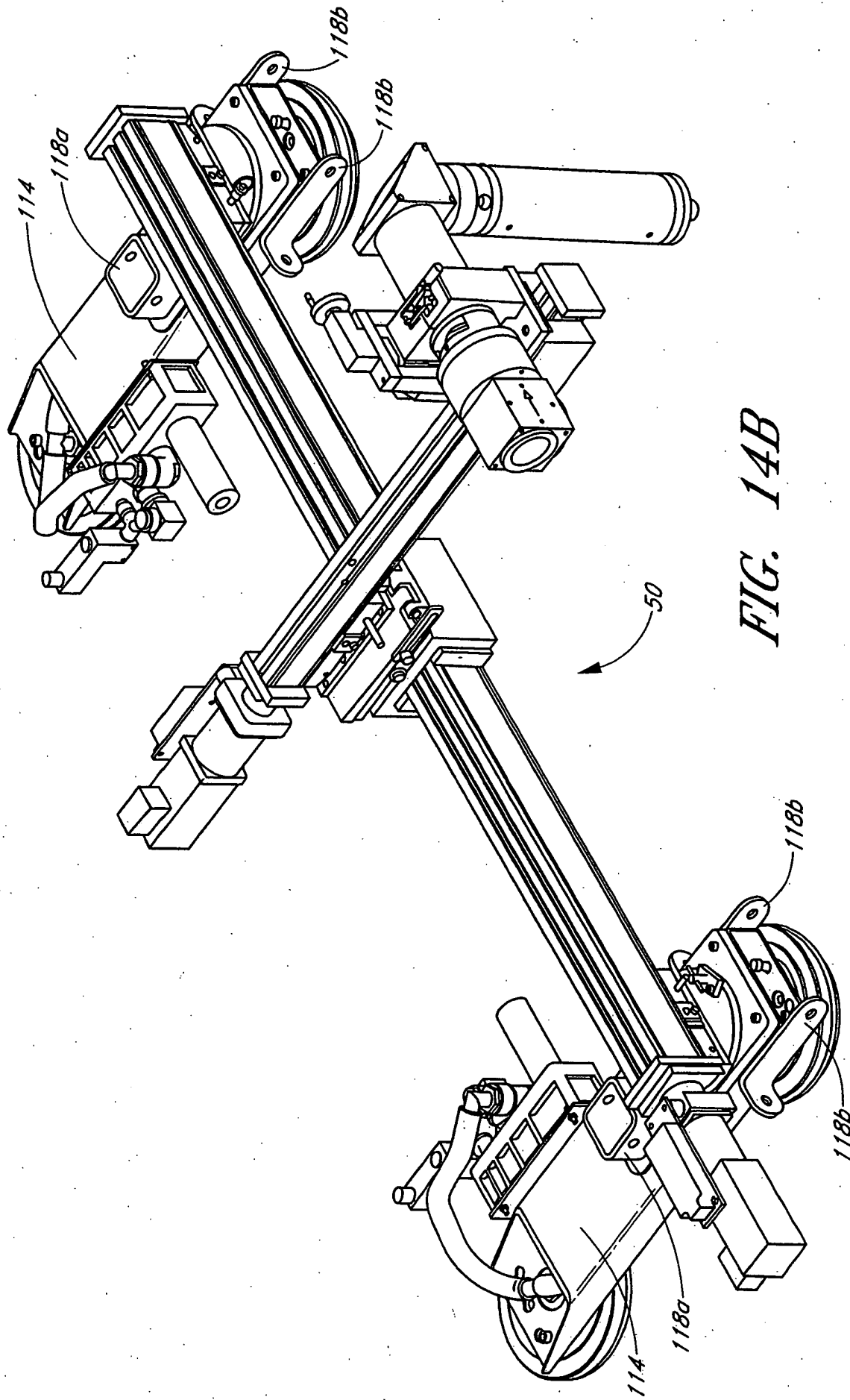


FIG. 14B

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
WITHIN AN INTERACTION REGION OF A STRUCTURE
IRRADIATED WITH LASER LIGHT

Inventors: Paul E. Demey et al Filed.: March 18, 2004

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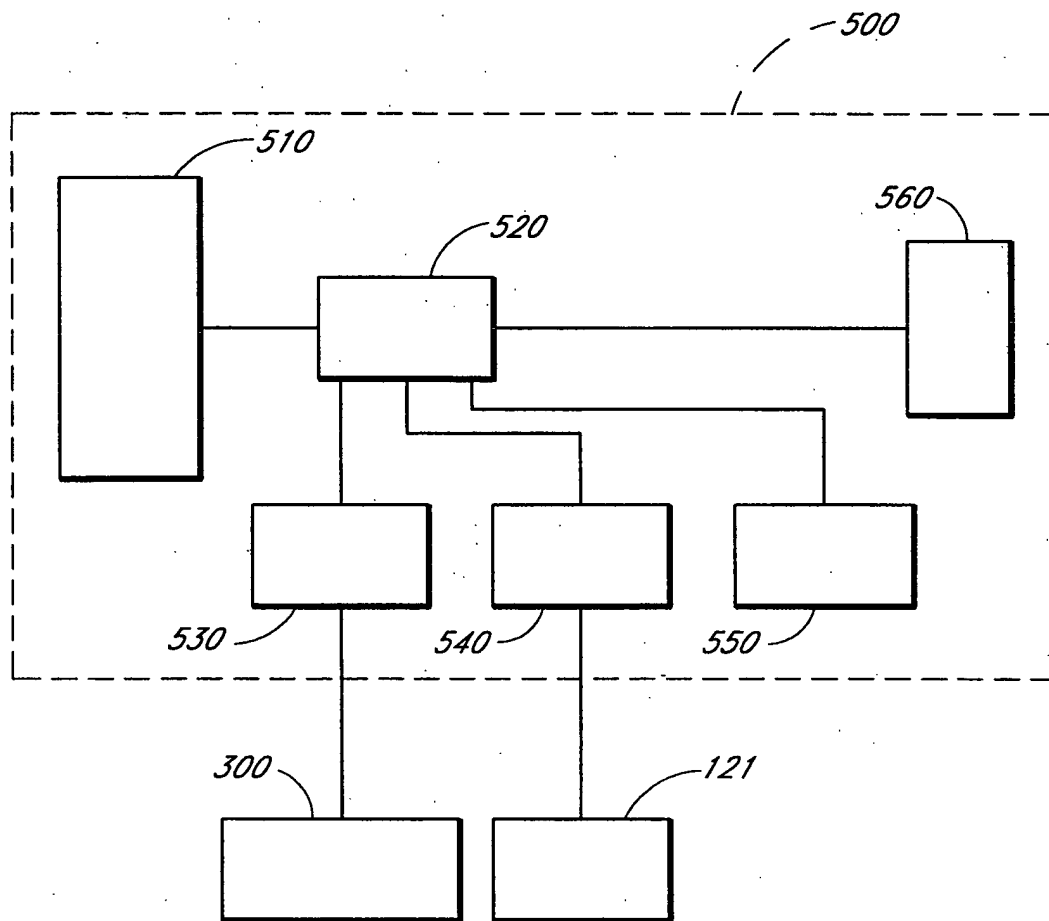


FIG. 15

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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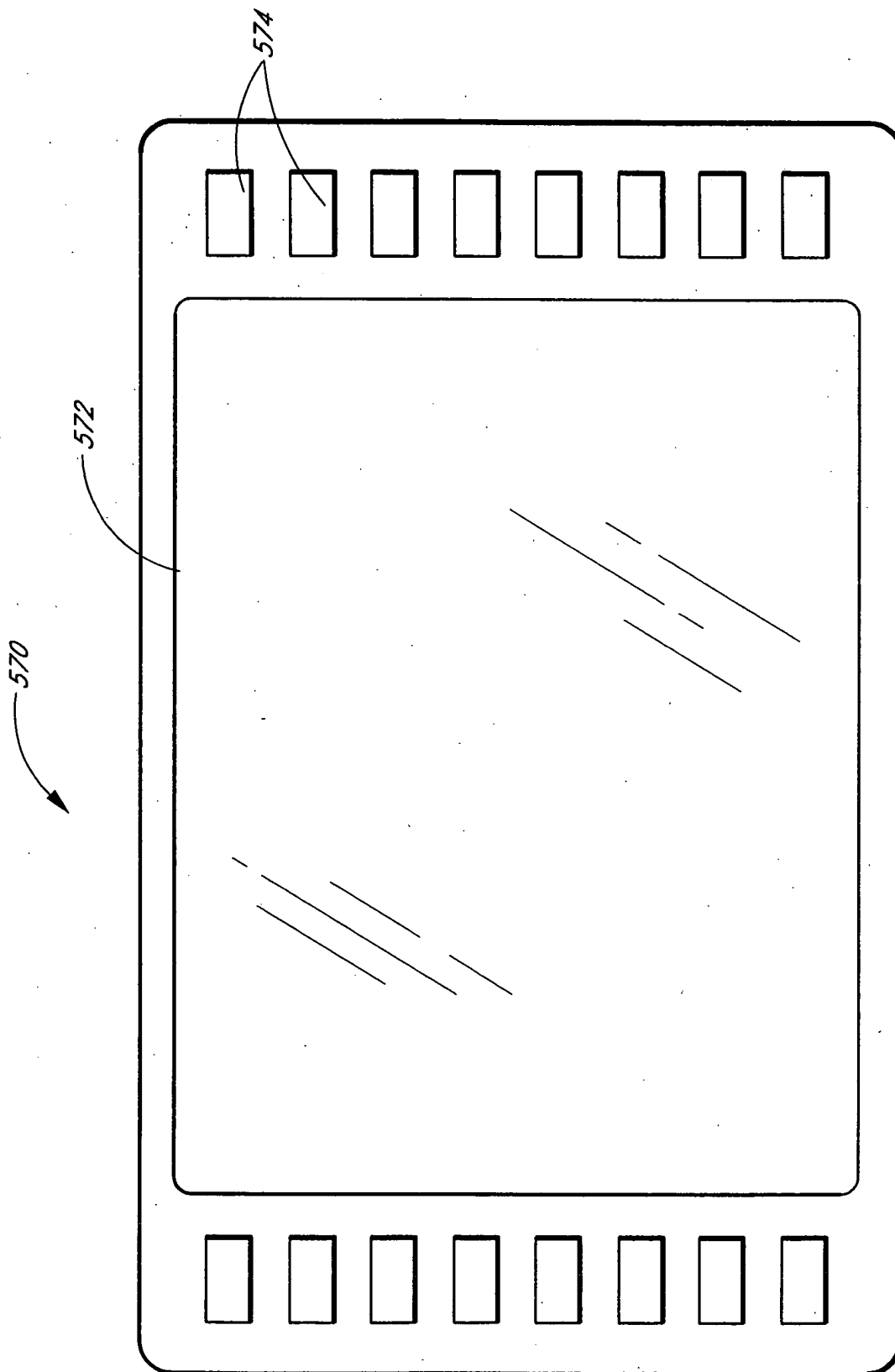


FIG. 16

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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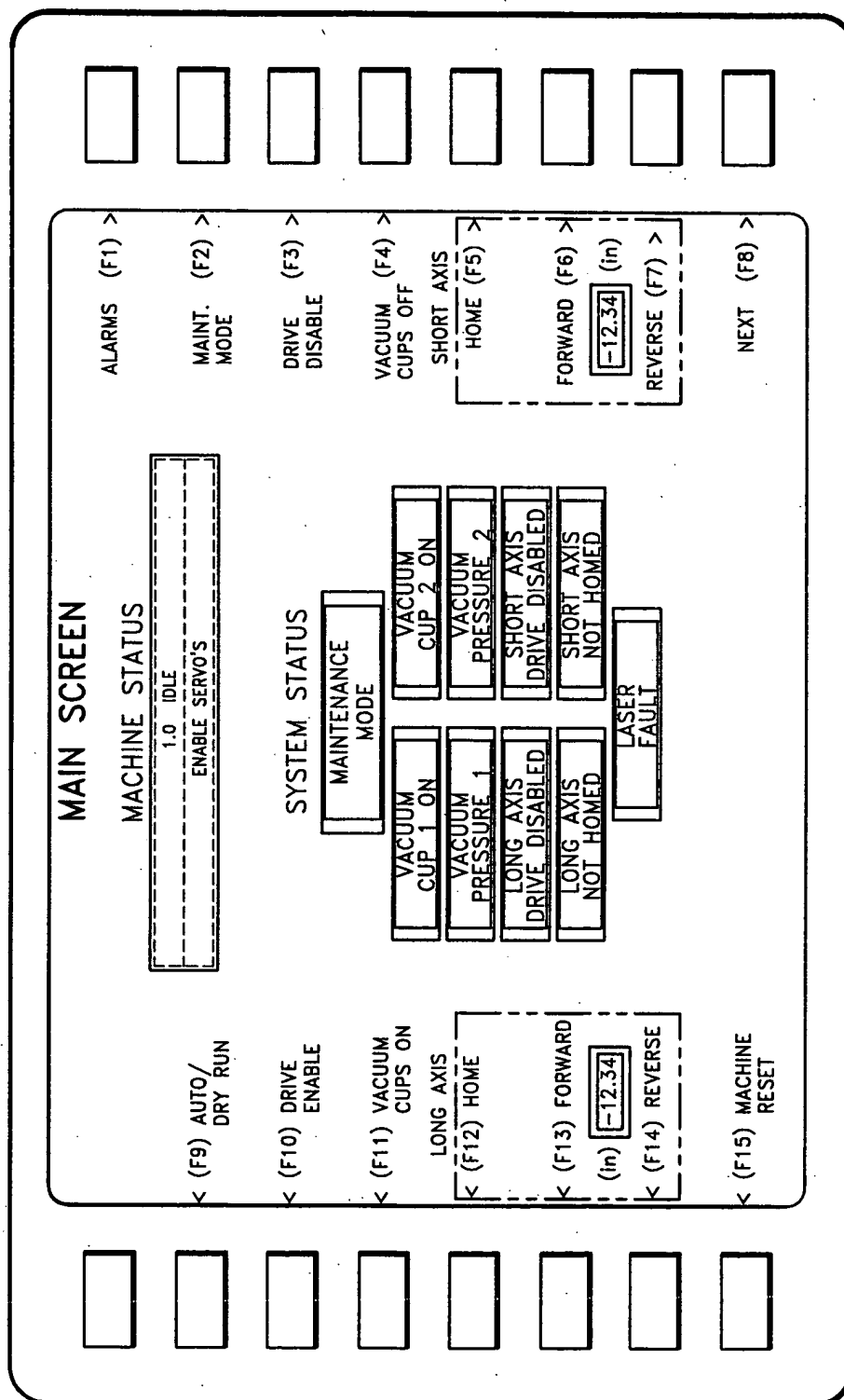


FIG. 17A

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
WITHIN AN INTERACTION REGION OF A STRUCTURE
IRRADIATED WITH LASER LIGHT

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SELECT OPERATION SCREEN

< (F9) AUTO/
DRY RUN

MACHINE STATUS

1.0 IDLE
ENABLE SERVO'S

< (F11) CIRCLE

LONG AXIS
POSITION

-12.34 (in)

< (F12) PIERCE

SYSTEM STATUS

MAINTENANCE
MODE

< (F13) STRAIGHT CUT

SHORT AXIS
POSITION

-12.34 (in)

< (F14) SURFACE
KEYING

CIRCLE
IDLE

< (F15) MACHINE
RESET

PIERCE
IDLE

STRAIGHT CUT
IDLE

SURFACE KEYING
IDLE

NEXT (F8) >

FIG. 17B

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PIERCE SETUP/OPERATION SCREEN

1.0 IDLE

ENABLE SERVO'S

3.0 PIERCE SEQUENCE IDLE

PRESS CYCLE START TO BEGIN

SYSTEM STATUS

MAINTENANCE MODE

LONG AXIS POSITION

-12.34 (in)

SHORT AXIS POSITION

-12.34 (in)

TIME (sec)

STATUS 1234

SET POINT 1234

LBU PROGRAM NUMBER

STATUS 12

SET POINT 12

< (F9) AUTO/ DRY RUN

< (F11) CYCLE START

< (F15) MACHINE RESET

CYCLE (F4) STOP

NEXT (F8) >

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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CUT SETUP/OPERATION SCREEN

MACHINE STATUS

1.0 IDLE
ENABLE SERVO'S

CUT STATUS

4.0 CUT SEQUENCE IDLE
PRESS CYCLE START TO BEGIN

SYSTEM STATUS

MAINTENANCE MODE

CUT PARAMETERS

LONG AXIS POSITION (in)

SHORT AXIS POSITION (in)

LENGTH (in)

SPEED (in/min)

PROGRAM NUMBER

LONG AXIS NOT SELECTED

SHORT AXIS NOT SELECTED

FUNCTION KEYS:

< (F9) AUTO/ DRY RUN

< (F11) CYCLE START

< (F13) LONG AXIS

< (F14) SHORT AXIS

< (F15) MACHINE RESET

> CYCLE (F4) STOP

> NEXT (F8)

FIG. 17E

SURFACE KEYING SETUP/OPERATION SCREEN

MACHINE STATUS

1.0 IDLE
ENABLE SERVO'S

SURFACE KEYING STATUS

5.0 KEYING SEQUENCE IDLE
PRESS CYCLE START TO BEGIN

SYSTEM STATUS

MAINTENANCE
MODE

LONG AXIS POSITION
[-12.34] (in)

PROGRAM NUMBER
STATUS [12]
SET POINT [12]

SHORT AXIS POSITION
[-12.34] (in)

LONG AXIS LENGTH (in)
STATUS [-12.34]
SET POINT [-12.34]

SPEED (in/min)
STATUS [-12.34]
SET POINT [-12.34]

OFFSET (in)
STATUS [-12.34]
SET POINT [-12.34]

< (F9) AUTO/
DRY RUN

< (F11) CYCLE
START

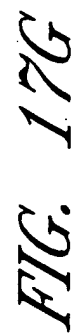
< (F15) MACHINE
RESET

CYCLE (F4) >
STOP

NEXT (F8) >

FIG. 17F

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METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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MAINTENANCE SCREEN

WARNING:
OPERATION FROM THIS SCREEN
BYPASSES SYSTEM INTERLOCKS

SYSTEM STATUS

MAINTENANCE MODE

VACUUM CUP 1 ON

VACUUM PRESSURE 1

LONG AXIS DRIVE DISABLED

LASER AIR SOLENOID OFF

LONG AXIS NOT HOMED

VACUUM CUP 2 ON

VACUUM PRESSURE 2

SHORT AXIS DRIVE DISABLED

LASER AIR PRESSURE

SHORT AXIS NOT HOMED

LASER FAULT

JOG SPEED (in/min)

STATUS -12.34

SET POINT -12.34

-12.34

< (F9) AUTO/ DRY RUN

< (F10) DRIVE ENABLE

< (F11) VACUUM CUPS ON

LONG AXIS

< (F12) HOME

< (F13) FORWARD

(in) -12.34

< (F14) REVERSE

< (F15) MACHINE RESET

ALARMS (F1) >

LASER AIR (F2) >
ON/OFF

DRIVE (F3) >
DISABLE

VACUUM (F4) >
CUPS OFF

SHORT AXIS

HOME (F5) >

FORWARD (F6) >

-12.34 (in)

REVERSE (F7) >

NEXT (F8) >

FIG. 17H

METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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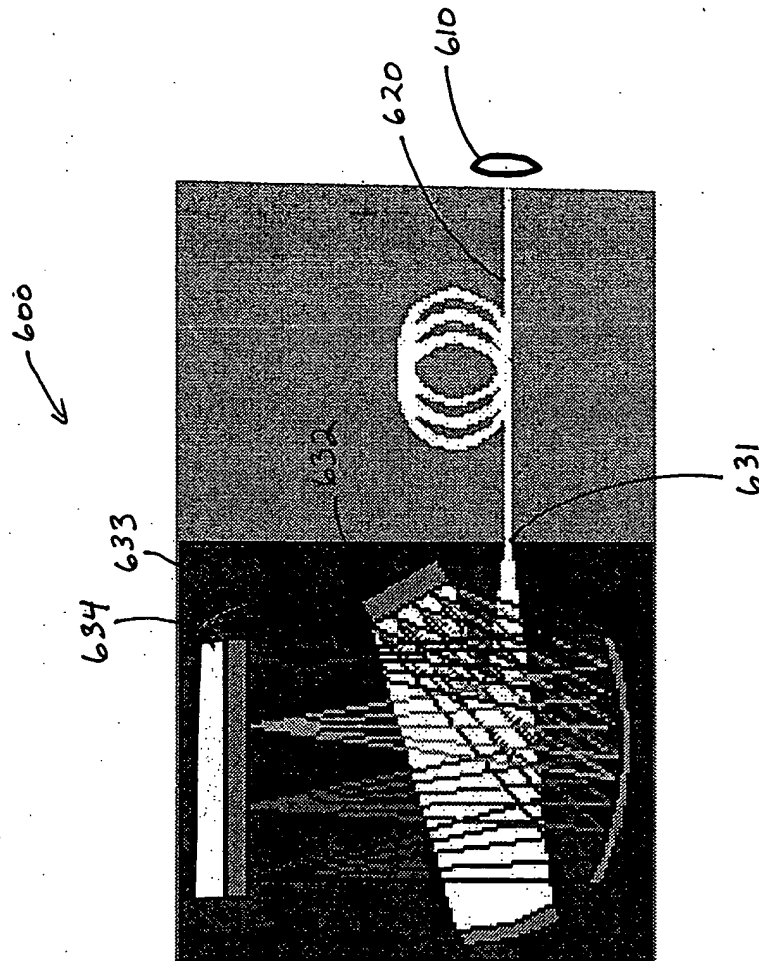


Figure 18A:

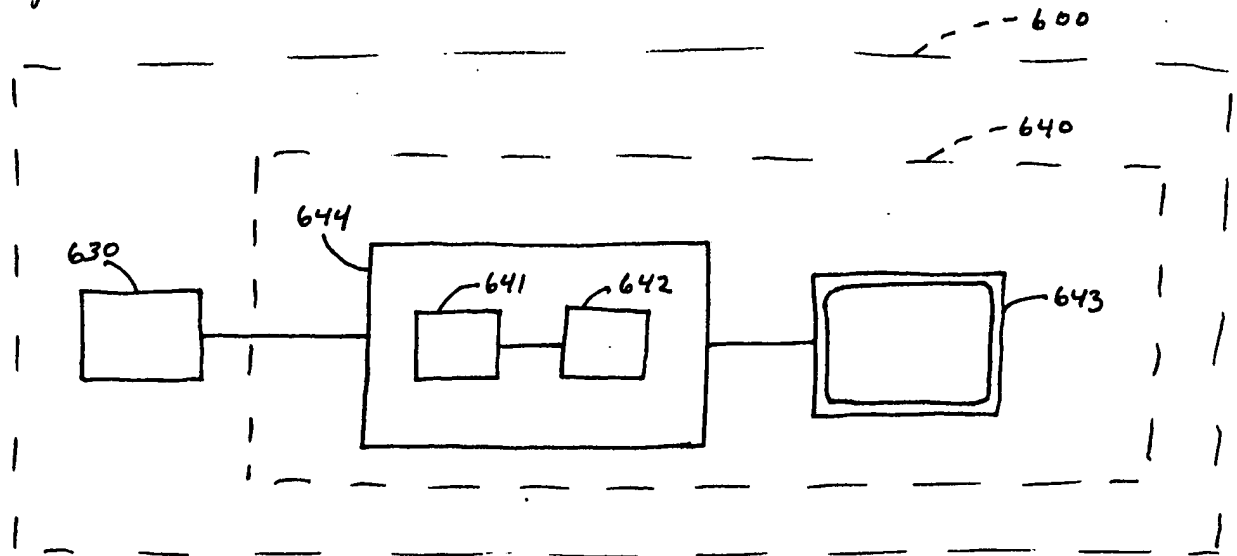
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Figure 18B:



METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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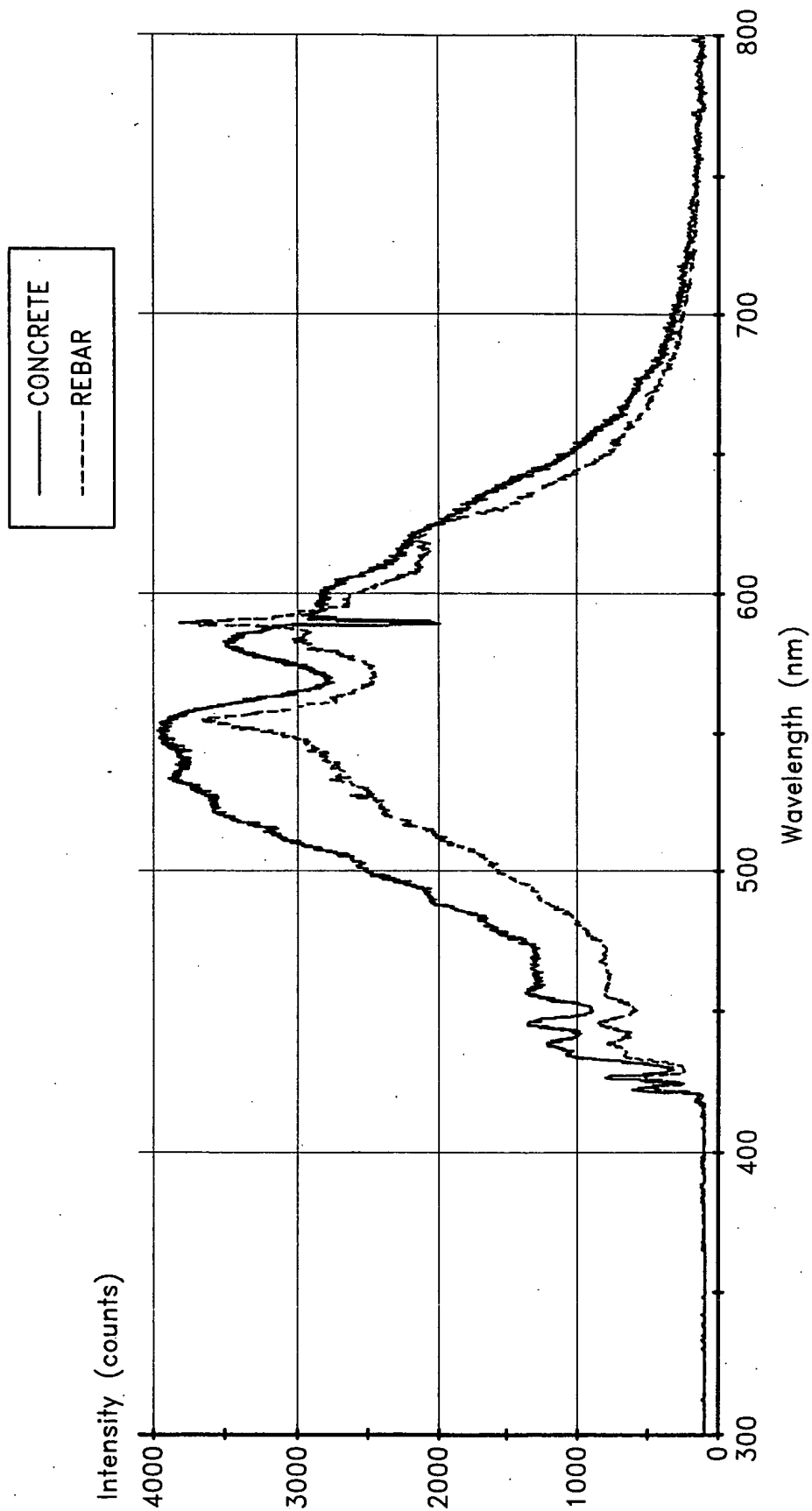


FIG. 19

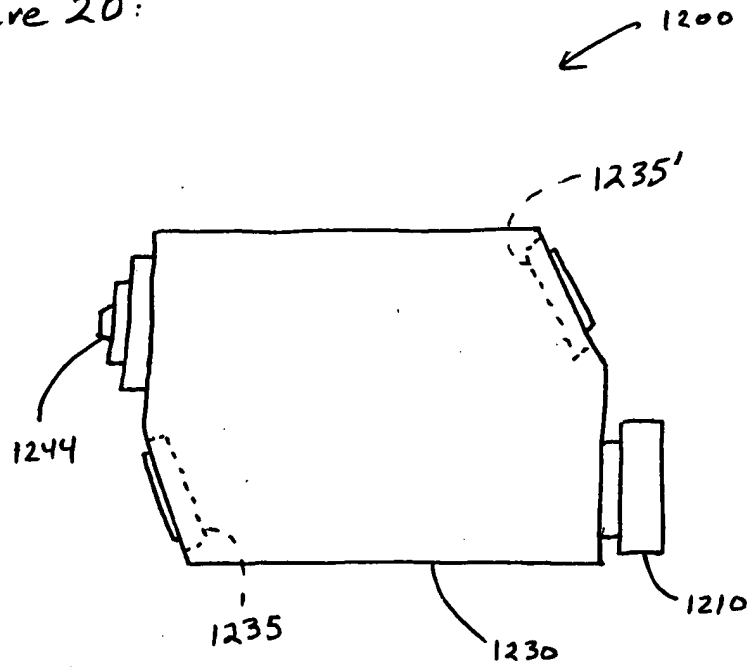
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Figure 20:



METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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Figure 21A:

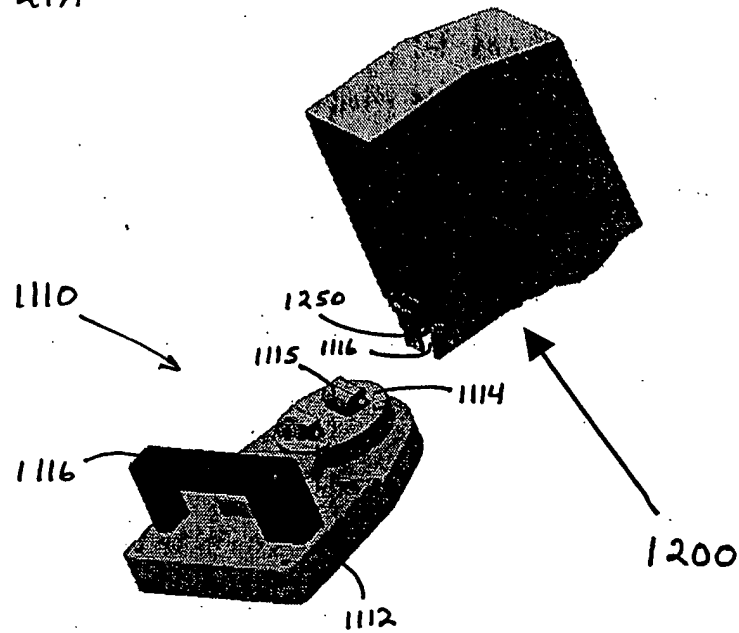
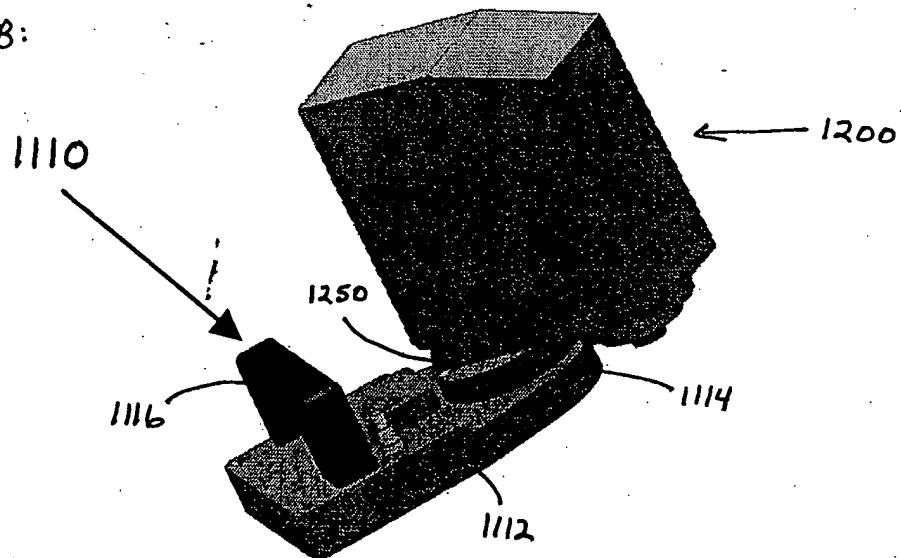


Figure 21B:



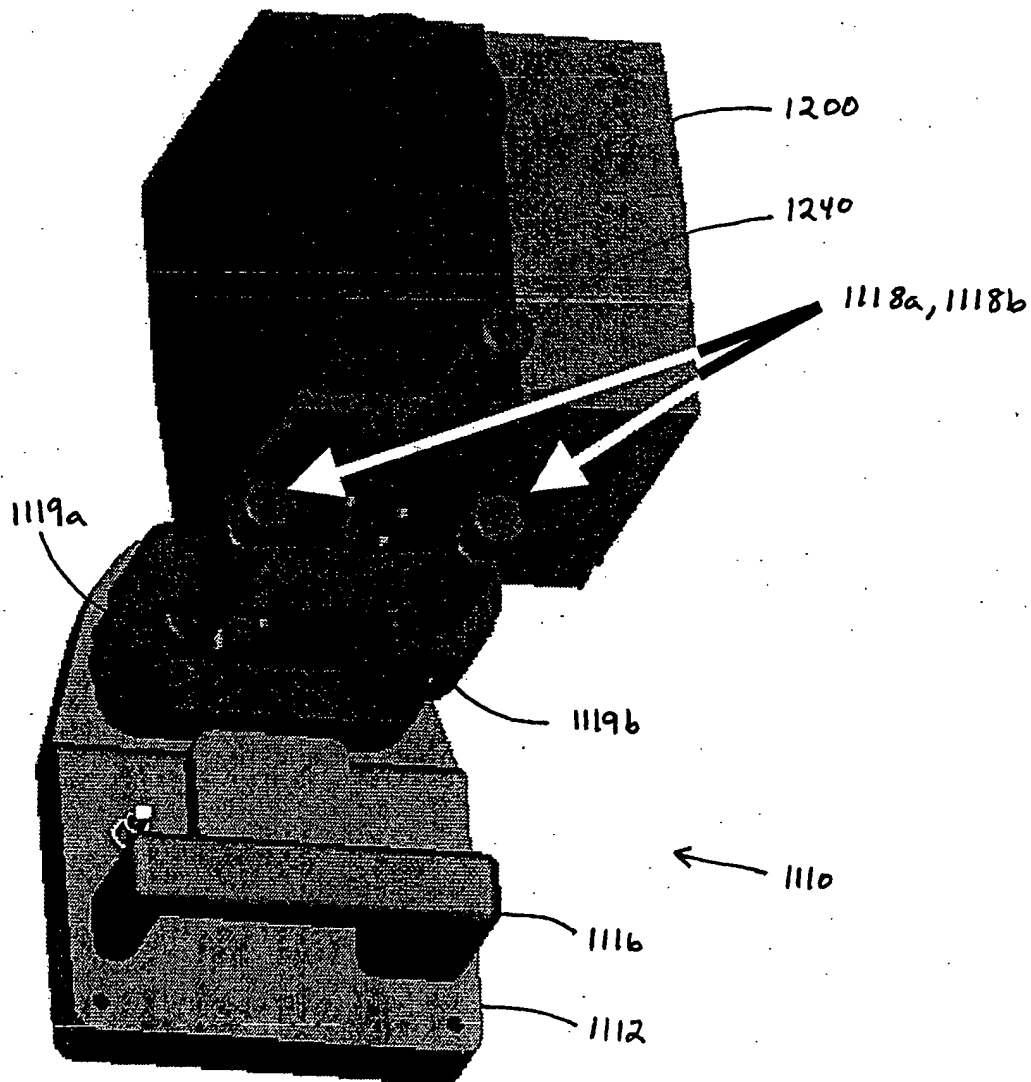
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Figure 21C:



METHOD AND APPARATUS FOR DETECTING EMBEDDED REBAR
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Figure 210:

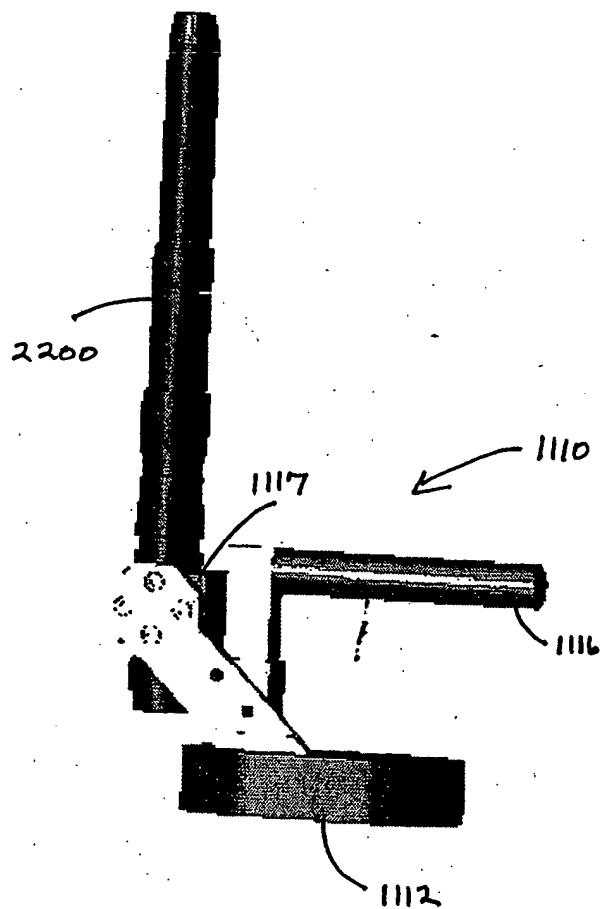


Figure 22:

